

### REMARKS

Claims 1-9 were originally filed in this application. Claims 1-9 were cancelled without prejudice or disclaimer, and claims 10-36 were previously added. Claims 10, 20, 22, and 27 are currently amended. No claims are currently added. Support for these amendments may be found in the specification, claims, and figures as originally filed. Specifically, support for the amendment to independent claims 10, 20, and 22 can be found in paragraphs 12, 26, 27, 29 and FIGS. 1 and 2 of the application as filed. For example, support for the claim element “the aeration hood configured and arranged such that air fed into the aeration hood will displace feed liquid and lower the level of feed liquid in the aeration hood,” can be found in paragraph 27 of the application as filed. Support for the amendment to independent claim 27 can be found in FIG. 1 and claim 8 of the application as filed. As a result, claims 10-13 and 15-36 are pending for examination with claims 10, 20, 22, and 27 being independent claims. No new matter has been added.

### Rejections Under 35 U.S.C. § 103

Claims 10-13 and 15-36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Cote et al., U.S. Patent No. 5,607,593 (hereinafter “Cote”) in view of Miyashita et al., U.S. Patent No. 6,280,626 B1 (hereinafter “Miyashita”).

Applicant disagrees that claims 10-13 and 15-34 would have been obvious over Cote in view of Miyashita. No *prima facie* case of obviousness of these claims over Cote in view of Miyashita can be made. Cote and Miyashita could not have been validly combined. Further, any alleged combination of Cote with Miyashita would not have taught each and every element of claims 10-13 and 15-34.

Cote is directed to an installation for the treatment of water including a wall 9 demarcating a double bottom within a reactor 1 and several filtration modules 3, each constituted by several hollow fiber membranes housed in a sheath 5, 5a. The filtration modules 31 are attached to the wall 9 at their lower ends. (Cote at Col. 8, lines 45-47; FIGS. 1, 3, 4, 6-8, 9, 10.) The filtration modules 31 have open-worked zones 8 at their lower ends and either open-worked zones 8a at their upper ends, or holes 8b in a plate at

their upper ends. Ozone supply means, 6, 15 is provided to introduce ozone into the filtration modules 31.

Miyashita is directed to a membrane separator assembly for separating solids from water comprising a plurality of membrane filtration elements arranged as vertically oriented sheets 113 affixed to membrane fixing members 114 in a treatment vessel 100. (Miyashita FIG. 2A and Col. 4, lines 15-39.) At least two wall structures 106 are arranged substantially parallel with the membrane modules. (Miyashita at Col. 4, lines 52-54.) A gas diffuser is provided directly below the separating membranes. (Miyashita FIG. 2A and Col. 4, lines 40-41.)

There is no *prima facie* case of obviousness of claims 10-13 and 15-34 over Cote in view of Miyashita because the references could not have been validly combined. One of ordinary skill in the art would not have been motivated to combine Cote with Miyashita in the manner suggested. The Examiner asserts that the motivation to combine Cote with Miyashita would be to enclose the multiple filtration modules of Cote within the sidewalls as taught by Miyashita because such a modification would serve to guide the gas provided by the gas diffuser to the surfaces of the separating membranes to clean the surfaces of vertically oriented separated membranes of the membrane modules with a gas-liquid mixed flow generated by the diffused gas. The Examiner also asserts that a motivation for combining Cote with Miyashita would be to promote efficient scrubbing of the separating membranes and that another motivation would be to create a gas-liquid mixed flow containing bubbles to scrub the surfaces of the separating membranes thereby preventing solid matter from being deposited on and clogging the surfaces of the membranes.

None of these alleged motivations would have induced one of skill in the art to have combined Cote with Miyashita in the manner suggested because the membranes of Cote are already surrounded by sheaths 5, 5a and surrounding the sheaths with an additional housing, such as sidewalls 206 or 220 of Miyashita would serve no purpose. Surrounding the sheaths of Cote with an additional housing would not provide further advantages because sheaths 5, 5a already serve to guide and confine ozone provided by ozone distribution system 6, 15. One of ordinary skill in the art would have realized that to provide an additional housing about sheaths 5, 5a would not serve to further guide gas

toward membrane modules in sheaths 5, 5a because according to Cote, ozone aeration bubbles are introduced only internal to sheaths 5, 5a and are retained about the membrane modules by sheaths 5, 5a. Sheaths 5, 5a would have isolated membranes contained therein from any aeration bubbles that would have been introduced into an area defined by sidewalls 206, 220 of Miyashita but outside sheaths 5, 5a, thereby defeating the purpose of Miyashita's sidewalls 206, 220. Thus, one of ordinary skill of the art would not have been motivated to combine Cote with Miyashita in the manner suggested because the addition of an additional housing, such as Miyashita's sidewalls 206, 220 about sheaths 5, 5a of Cote would only increase the size, footprint, complexity, and cost of the filtration system according to Cote and provide no benefits to the system.

Any alleged combination of Miyashita with Cote would have resulted in an apparatus including a number of tubes containing filtration membranes and a source of ozone within the tubes, the tubes sealed on their lower ends to a double wall and surrounded by an enclosure wall structure. This alleged combination is distinct from and does not render obvious any of the claimed embodiments of the present invention for the reasons discussed below.

No alleged combination of Cote with Miyashita would have resulted in or rendered obvious the filtration arrangement as claimed in any of independent claims 10, 20, 22, or 27. Sheaths 5, 5a of Cote do not comprise open-ended tubes extending downwardly from the upper wall of an aeration hood as recited in independent claims 10 and 22. The Examiner alleges that Cote FIGS. 10 and 11 disclose "open-ended tube[s] descending downwardly," however these figures clearly show the sheaths joined to a wall on their bottom end, not extending downward from an upper wall.

Further, sheaths 5, 5a of Cote do not comprise at least one aeration opening in a wall thereof as recited in independent claims 10, 20, and 22. The Examiner appears to assert that open-worked zones 8 and 8a of sheaths 5, 5a of Cote are aeration openings, however, they cannot be because Cote discloses that ozone is pumped directly into the center of sheaths 5, 5a from an ozone-injection means 6 by way of an ozone supply tube 14 (Cote at FIGS. 1, 4, 5, 6, 6A, 6B, 7, and 8) or a porous structure 16 at the base of and internal to the sheaths 5, 5a. Thus, ozone never passes into the sheaths through these open-worked zones.

In FIG. 9, Cote discloses ozone supply tubes 15 external to the sheath 5a, however the ozone is directed into the sheath 5a through flaps extending from the bottom of sheath 5a, not through aeration openings in a wall of sheath 5a. If ozone enters sheath 5a through the lower open-worked zone, this open-worked zone cannot be an aeration opening in a wall of the open-ended tube because the wall of the sheath 5a terminates where the open-worked zone begins. If the open-worked zones 8, 8a were to be considered part of the wall of sheaths 5, 5a, then sheaths 5, 5a could not be considered open-ended tubes because they are disclosed as capped on each end at the termination of open-worked zones 8, 8a.

The Examiner concedes in paragraph 5 of the Office Action that Cote does not teach an assembly of open-ended tubes within the confines of an aeration hood. Nothing in Miyashita discloses, teaches, or suggests an assembly of open-ended tubes within the confines of an aeration hood either.

Miyashita does not disclose, teach, or suggest an aeration hood configured and arranged such that gas fed into the aeration hood will displace feed liquid and lower a level of feed liquid in the aeration hood, as recited in independent claims 10, 20, and 22. Miyashita suggests that a plate may be provided as a connecting member for walls 106a and 106b and that this plate may extend horizontally between the enclosure wall structures (Miyashita at Col. 4, line 67 – Col. 5, line 1), but Miyashita states that this plate “should include flow passages therethrough so as to permit liquid to flow through the enclosure wall subassembly in a vertical direction.” (Miyashita at Col. 5, lines 2-4.) Thus, even if this plate were located at the upper end of the enclosure wall structure of Miyashita, it could not be an upper wall of an aeration hood configured and arranged such that gas fed into the aeration hood will displace feed liquid and lower a level of feed liquid in the aeration hood because any gas fed into the structure of Miyashita would escape through the “flow passages” in the plate, and thus could not displace feed liquid from within the structure. The Examiner’s reliance on Miyashita’s suggestion is misplaced because a plate such as that suggested in Miyashita cannot serve as an upper wall that allows displacement of feed liquid from within the aeration hood as described in paragraphs 20 and 27 of the present specification and as claimed in independent claims 10, 20, and 22.

Accordingly, no combination of Miyashita with Cote can disclose, teach, or suggest the filtration arrangement as recited in independent claims 10, 20, and 22.

Thus, no *prima facie* case of obviousness of independent claims 10, 20, and 22 can be made over Cote in view of Miyashita. The references cannot be validly combined because one of ordinary skill in the art would have had no motivation to combine them. Further, any alleged combination of Cote with Miyashita would have lacked at least one explicitly recited claim element in each of independent claims 10, 20, and 22.

Accordingly, reconsideration and withdrawal of the rejection of independent claims 10, 20, and 22 under 35 U.S.C. § 103 as being unpatentable over Cote in view of Miyashita is respectfully requested.

Dependent claims 11-13, 15-19, and 35 depend from independent claim 10 and are patentable for at least the same reasons as independent claim 10. Dependent claim 21 depends from independent claim 20 and is patentable for at least the same reasons as independent claim 20. Dependent claims 23-26 and 36 depend directly or indirectly from independent claim 22 and are patentable for at least the same reasons as independent claim 22. Accordingly, reconsideration and withdrawal of the rejection of dependent claims 11-13 and 15-19, 21, 23-26, 35, and 36 under 35 U.S.C. § 103 as being unpatentable over Cote in view of Miyashita is respectfully requested.

No *prima facie* case of obviousness of independent claim 27 over Cote in view of Miyashita can be made. Independent claim 27 would not have been obvious over Cote in view of Miyashita because the references could not have been validly combined. A person of ordinary skill in the art would not have been motivated to modify or combine Cote with Miyashita in the manner suggested to arrive at subject matter as presently claimed for the reasons discussed above. Further, even if the references could have been combined, no alleged combination would have taught each and every limitation of independent claim 27.

Both Cote and Miyashita fail to disclose any open-ended tube distinct from any side wall of an aeration hood, and having an open end sealingly secured to an upper wall of an aeration hood at an opening in the upper wall, a membrane module disposed within the tube, the tube extending part way along the length of the membrane module to define

an open region adjacent the lower end of the membrane module, the membrane module in fluid communication with the water to be treated through the opening in the upper wall, as recited in independent claim 27. Cote describes sheaths 5, 5a secured to a lower wall 9 of a filtration chamber, not to any upper wall of any aeration hood, and Miyashita does not disclose any open-ended tubes distinct from any side wall of an aeration hood whatsoever, let alone open-ended tubes having open ends sealingly secured to an opening in an upper wall of an aeration hood. Miyashita cannot disclose an upper wall of an aeration hood at all, for the reasons discussed above. In fact, the Office Action points to no part of either Cote or Miyashita which discloses open-ended tubes distinct from any side wall of an aeration hood, and having an open end sealingly secured to an upper wall of an aeration hood at an opening in the upper wall.

Further, one of skill in the art would not have combined Cote with Miyashita in a manner that resulted in an open-ended tube distinct from any side wall of an aeration hood sealingly secured to an upper wall of an aeration hood, as recited in independent claim 27, because this would have rendered the apparatus of Cote inoperable as there would then be no upper open-worked zone 8 in the sheath 5a to act as a return path for circulating liquid to be treated as illustrated in Cote FIG. 10.

Even further, neither Cote nor Miyashita disclose an open-ended tube extending part way along the length of the membrane module to define an open region adjacent the lower end of the membrane module. Although Cote describes that sheaths 5, 5a may have open-worked zone 8 proximate a lower end thereof, open-worked zone 8 is not an open region. Rather open-worked zone 8 is defined by a structure, illustrated in Cote as lines connecting portions of sleeve 5a, which confines membrane module 14 contained therein.

Thus, no *prima facie* case of obviousness of independent claim 27 can be made over Cote in view of Miyashita because the references could not have been validly combined in the manner suggested and because any alleged combination Cote with Miyashita would have lacked at least one explicitly recited claim element in independent claim 27.

Accordingly, reconsideration and withdrawal of the rejection of independent claim 27 under 35 U.S.C. § 103 as being unpatentable over Cote in view of Miyashita is respectfully requested.

Dependent claims 28-34 depend directly or indirectly from independent claim 27 and are patentable for at least the same reasons as independent claim 27.

Accordingly, reconsideration and withdrawal of the rejection of dependent claims 28-34 under 35 U.S.C. § 103 as being unpatentable over Cote in view of Miyashita is respectfully requested.

**CONCLUSION**

In view of the foregoing Amendments and Remarks, this application is in condition for allowance; a notice to this effect is respectfully requested. If the Examiner believes that the application is not in condition for allowance, the Examiner is requested to call Applicant's attorney at the telephone number listed below.

If this Response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this Response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50/2762. (Ref. No. M2019-7023US)

Respectfully submitted,  
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